UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/360,582	07/26/1999	BRANDON W. BLACKBURN	MIT-8312	4382

7590 08/06/2008

PATRICK J O'SHEA ESQ
SAMUELS GAUTHIER & STEVENS LLP
225 FRANKLIN STREET SUITE 3300
BOSTON, MA 02110

EXAMINER	
MONDT, JOHANNES P	

ART UNIT	PAPER NUMBER
3663	

MAIL DATE	DELIVERY MODE
08/06/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/360,582
Filing Date: July 26, 1999
Appellant(s): BLACKBURN, BRANDON W.

Matthew E. Connors
Reg. No.: 33,298
Gauthier & Connors,
225 Franklin Street, Suite 2300
Boston, MA 02110
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 5/21/08 appealing from the Office action mailed 11/01/2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct with regard to the appealed claims. Claims 2, 3 and 6 were cancelled.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,392,319	EGGERS ET AL.	02-1995
5,784,423	LIDSKY ET AL.	07-1998
4,141,224	ALGER ET AL.	02-1979
5,795,063	CHRISTIAENS ET AL.	08-1998
3,267,730	SATTERTHWAITE ET AL.	08-1966
5,148,620 B1	ROSER, GEORGES	09-1992
6,258,620 B1	MOREL ET AL.	07-2001
RU-2069 391C1	FILATOV, V.V.	11-1996

Pais et al, "Single-Phase Heat Transfer Characteristics of Submerged Jet Impingement Cooling Using JP-5", in Intersociety Conference on Thermal Phenomena 1994, pp. 178-183, IEEE Catalog No.: 0-7803-1372-0.

Merriam-Webster's Collegiate Dictionary, tenth Ed., p. 328 (Merriam-Webster, Inc., Springfield, MA, USA (1999).*ISBN: 0-87779-708-0).

American Heritage Dictionary of Idioms, 1997: “filled to the brim”.

(9) Grounds of Rejection

The following ground(s) of rejection, copied without any change intended, from the Final Office Action, are applicable to the appealed claims:

BEGIN GROUNDS OF REJECTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. ***Claims 1, 4-5, 7 and 8*** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor, at the time the application was filed, had possession of the claimed invention.

In particular, a method of cooling a low Z target material for a neutron assembly or a liquid cooling system for a neutron assembly or a neutron source assembly having a liquid cooled target with cooling system, <u>including a nozzle submerged in liquid gallium</u> as recited in independent claims 1 (line 3), claim 5, line 7) and claim 8 (line 5) has not been disclosed in the original Specification including original claims. According to the Specification, the “liquid gallium fills chamber 40”, while the “source includes a nozzle 34”. However, not disclosed is whether nozzle (shown over or in chamber 40 (Figure 2) is in said chamber 40, nor whether, even if nozzle 34 is in chamber 40, said chamber is filled enough so as to cause said nozzle to be submerged in said liquid gallium. Reference is also made to “initial tests, using water coolant” in a “submerged jet impingement configuration” (Specification, page 6, lines 18-20 as originally filed). However, “submerged jet” does not necessarily mean “submerged nozzle” (see, e.g., Pais et al, IEEE, 1994 Intersociety Conference on Thermal Phenomena, “Single-Phase Heat Transfer Characteristics of Submerged Jet Impingement Cooling using JP-5”, pp. 178-183, especially title, abstract, and page 182), while, even arguendo, the experiments “to illustrate the effectiveness of gallium cooling” (pages 7-8 of original Specification) are described without reference to either submerged jet or submerged

nozzle. In conclusion, original Specification and claims do not support the amendment to claims 1, 5 and 8 and to dependent claims 2, 4, and 6-7.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. ***Claims 1, 4, 5 and 7*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Eggers (5,392,319) (previously made of record as Prior Art and cited in Specification) in view of Lidsky et al (previously made of record), Pais et al (IEEE 0-7803-1372-0, 1994) and Alger (4,141,224).

On claim 1: Eggers teaches (see title, abstract, and Figures 1, 10-11) a method of cooling a low Z target material of a neutron source assembly, comprising: providing flow of <u>liquid coolant</u> (light water and D_2O; col. 12, l. 51 – col.13, l. 68) to a <u>low Z</u> (col. 6, l. 13-58 and col. 7, l. 5-20) <u>target material</u> within the neutron assembly (target support region 116, on target carriage 26; target material is inherently part of the neutron assembly: no target material, no neutrons) (loc.cit.) <u>to cool the low Z target material</u> (loc.cit.).

Eggers does not necessarily teach said liquid gallium as liquid coolant. However, it would have been obvious to include the teaching of liquid gallium as coolant for an irradiation target in view of <u>Lidsky et al</u> (col. 7, l. 10-20) being at least suitable as equivalent to water (loc.cit.). It has been held that the selection of a particular material

known in the art to be suitable for its intended purpose would be entirely obvious. In re Leshin 125 USPQ 416. Eggers further teaches the liquid coolant 134 (col. 9, l. 28) to be provided to a non-bombarded surface (inside surface of 116 within 26 rather than the outside surface bombarded by the ion beam 22 (see Figures 1, 10).

Eggers does not necessarily teach the limitation of using "a nozzle submerged in said liquid gallium, a submerged jet of concentrated liquid gallium in a direction normal to a non-bombarded surface of the low Z target material". However, it would have been obvious to include said limitation in view of Pais et al, who, in art (inter alia on X-ray medical devices) on cooling by jet impingement (title, abstract, Introduction, page 178), hence in this regard analogous to Eggers, teach hitting the target in a direction normal to a non-bombarded surface of said low Z target material (see Figure 1 and Introduction, page 178) with a submerged jet (title, abstract) in which cooling method the nozzle is preferably completely submerged in the cooling liquid (see "Fully submerged Nozzle and Surface", page 182, and compare Figure 7 for the case of submerged nozzle with Figure 8, showing a superior heat transfer in the former case, also summarized in the conclusions (page 181-182). *Motivation* to include the teaching by Pais et al in the invention by Eggers derives from the enhanced heat transfer and consequent higher cooling efficiency, as illustrated by Figure 7 when compared with Figure 8 in Pais et al and the Conclusions by Pais et al of larger heat transfer coefficients (page 182). Parenthetically, the physics behind the superior heat transfer of submerged jets over free surface jet impingement has long been understood: see, e.g., Christiaens et al (5,795,063), especially the discussion in col. 8, l. 35-63), being due to

heat transfer by turbulence. Said turbulence arises whenever a submerged jet mixes with the surrounding liquid and hence applies also to the topography of Eggers.

Eggers does not necessarily teach the limitations on reservoir provision and specific pumping as claimed (final five lines of claim 1). However, it would have been obvious to include said limitations in view of the cooling apparatus as taught by Alger et al comprising a liquid coolant reservoir 23 (col. 2, l. 23-24) while the liquid coolant is pumped from the reservoir (through 27, see col. 2, l. 24 and Figures 1 and 2) through the nozzle 29 (col. 2, l. 57-60) such that the coolant impinges on the target (in application to Eggers low Z) target material and cools the target material (see rejection of claim 1 above), from the neutron source assembly directly to a heat exchanger 28 (col. 2, l. 24-27) to remove heat from the liquid coolant (a cooling system necessarily effects the exchange of heat and hence is a heat exchanger), means for recirculating said liquid coolant between said reservoir 23, said heat exchanger 28 and said accelerator based neutron source 11 in the form of pump 27 (thus meeting the additional limitation defined by claim 7) and nozzle 29 (col. 2, l. 24 and col. 2, l. 28-30). Note that recirculation is implied by the disclosure of a “closed loop” (see abstract). *Motivation* to include the teaching by Alger et al in the invention by Egger and Lidsky et al derives from the more efficient cooling through improved circulation as expressed by Alger et al (col. 1, l. 19-33 and 45-65) as is also generally known in the art of cooling apparatus as conventional, while circulating enables re-use, which is important for a more expensive coolant such as gallium, which expense is, however amply

compensated by the much higher coefficient of thermal conductivity (see applicant's admission in this regard on page 7 of the Specification).

On claim 4: the target material in Eggers comprises beryllium (col. 6, l. 48-51).

On claim 5: Eggers teaches a neutron source assembly 10 (title, abstract, col. 5, l. 40 – col. 6, l. 58) having a liquid cooled target (light water and D_2O; col. 12, l. 51 – col.13, l. 68), comprising: an accelerator based neutron source 16/26/116 (accelerator 16 (col. 7, l. 5-20), target carriage 26 and target 116 (col. 7, 5-20 and col. 8, l. 62-66) including a low Z target material within the accelerator-based neutron source (such as boron or beryllium) (col. 6, l. 13-59) (namely: low Z target 116 on target carriage 26; see col. 7, l. 5-20 and col. 8, l. 62-66) that is bombarded by accelerated particles (through proton accelerator 16; see col. 6, l. 13-51) to produce a neutron flux (col. 6, l. 13-59); and a cooling system (72/90 a/o, see above) to circulate liquid coolant (light water and D_2O; see above) through said accelerator based neutron source (namely: through 16/26/116) to cool the low Z target material.

Eggers does not necessarily teach said liquid gallium as liquid coolant. However, it would have been obvious to include the teaching of liquid gallium as coolant for an irradiation target in view of Lidsky et al (col. 7, l. 10-20) being at least suitable as equivalent to water (loc.cit.). It has been held that the selection of a particular material known in the art to be suitable for its intended purpose would be entirely obvious. In re Leshin 125 USPQ 416. Eggers further teaches the liquid coolant 134 (col. 9, l. 28) to be provided to a non-bombarded surface (inside surface of 116 within 26 rather than the outside surface bombarded by the ion beam 22 (see Figures 1, 10).

Eggers does not necessarily teach the limitation "said nozzle being submerged in said liquid gallium to provide a submerged jet of concentrated liquid gallium in a direction normal to a non-bombarded surface of the low Z target material".

However, whether said nozzle is submerged in liquid gallium and provides a submerged jet or not are limitations of intended use within the framework of the device invention of claim 5 (neutron source assembly being the device). Applicant is reminded that In reference to the claim language referring to "said nozzle being submerged" and "submerged jet", intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963).

Furthermore, even arguendo, it would have been obvious to include said limitation in *view of Pais et al*, who, in art (inter alia on X-ray medical devices) on cooling by jet impingement (title, abstract, Introduction, page 178), hence in this regard analogous to Eggers, teach a target positioned in an assembly such that jets are capable to be directed and impinge normal to a non-bombarded surface of said low Z target material (see Figure 1 and Introduction, page 178) with a submerged jet (title, abstract) in which assembly the nozzle is preferably completely submerged in the cooling liquid (see "Fully submerged Nozzle and Surface", page 182, and compare Figure 7 for the case of

submerged nozzle with Figure 8, showing a superior heat transfer in the former case, also summarized in the conclusions (page 181-182). *Motivation* is spelled out by Pais et al to be the enhanced heat transfer, hence better cooling (see "Conclusions", page 182). Parenthetically, the physics behind the superior heat transfer of submerged jets over free surface jet impingement has long been understood: see, e.g., Christiaens et al (5,795,063), especially the discussion in col. 8, l. 35-63), recited here not for teaching but for fact only.

Eggers nor Lidsky et al nor Pais et al necessarily teach the further inclusions of the cooling system as claimed (final 7 lines of claim 5). However, it would have been obvious to include said limitations in view of the cooling apparatus as taught by Alger et al comprising a liquid coolant reservoir 23 (col. 2, l. 23-24) while the liquid coolant is pumped from the reservoir (through 27, see col. 2, l. 24 and Figures 1 and 2) through the nozzle 29 (col. 2, l. 57-60) such that the coolant impinges on the target (in application to Eggers low Z) target material and cools the target material (see rejection of claim 1 above), from the neutron source assembly directly to a heat exchanger 28 (col. 2, l. 24-27) to remove heat from the liquid coolant (a cooling system necessarily effects the exchange of heat and hence is a heat exchanger), means for serially recirculating said liquid coolant between said reservoir 23, said heat exchanger 28 and said accelerator based neutron source 11 in the form of pump 27 (thus meeting the additional limitation defined by claim 7) which satisfies "means for serially circulating" under 112, sixth paragraph (see pump 14 (Figure 1 in the Specification)) and nozzle 29 (col. 2, l. 24 and col. 2, l. 28-30). Note that recirculation is implied by the disclosure of a

"closed loop" (see abstract). *Motivation* to include the teaching by Alger et al in the invention by Egger and Lidsky et al derives from the more efficient cooling through improved circulation as expressed by Alger et al (col. 1, l. 19-33 and 45-65) as is also generally known in the art of cooling apparatus as being conventional, while circulating enables re-use, which is important for a more expensive coolant such as gallium, which expense is, however amply compensated by the much higher coefficient of thermal conductivity (see applicant's admission in this regard on page 7 of the Specification).

3. ***Claim 8*** is rejected under 35 U.S.C. 103(a) as being unpatentable over Eggers in view of Lidsky et al, Pais et al and Alger et al (all previously cited).

Eggers teaches a liquid cooling system for a neutron source assembly (title, abstract, col. 5-17; Figures 1 and 10-11), said cooling system comprising: a <u>reservoir</u> (inherently existing behind check valve 92 of 90 as otherwise conduit 90 could not deliver said liquid coolant (col. 8, l. 24-29) (see Figures 1 and 10)); <u>a heat exchanger</u> 132 or 226 (col. 9, l. 23-35 and col. 13, l. 34). Eggers also teach <u>a low Z target material</u> (116 on 26) within the neutron source assembly 10 (col. 5, 63-68, col. 6, l. 13-58, col. 7, l. 5-20 and col. 8, l. 62-63).

Eggers does not necessarily teach said liquid gallium as liquid coolant. However, it would have been obvious to include the teaching of liquid gallium as coolant for an irradiation target in view of Lidsky et al (col. 7, l. 10-20) being at least suitable as equivalent to water (loc.cit.). It has been held that the selection of a particular material known in the art to be suitable for its intended purpose would be entirely obvious. <u>In re Leshin</u> 125 USPQ 416. Eggers further teaches the liquid coolant 134 (col. 9, l. 28) to be

provided to a non-bombarded surface (inside surface of 116 within 26 rather than the outside surface bombarded by the ion beam 22 (see Figures 1, 10).

Eggers does not necessarily teach the limitation "a nozzle, said nozzle being submerged in said liquid gallium providing a submerged jet of concentrated liquid gallium in a direction normal to a non-bombarded surface of the low Z target material".

However, apart from the nozzle itself, whether said nozzle is submerged in liquid gallium and provides a submerged jet or not are limitations of intended use within the framework of the device invention of claim 5 (neutron source assembly being the device). Applicant is reminded that In reference to the claim language referring to "said nozzle being submerged" and "submerged jet", intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963).

Furthermore, arguendo, it would have been obvious to include said limitation in *view of Pais et al*, who, in art (inter alia on X-ray medical devices) on cooling by jet impingement (title, abstract, Introduction, page 178), hence in this regard analogous to Eggers, teach a target positioned in an assembly such that jets are capable to be directed and impinge normal to a non-bombarded surface of said low Z target material (see Figure 1 and Introduction, page 178) with a submerged jet (title, abstract) in which

assembly a nozzle is preferably completely submerged in the cooling liquid (see “Fully submerged Nozzle and Surface”, page 182, and compare Figure 7 for the case of submerged nozzle with Figure 8, showing a superior heat transfer in the former case, also summarized in the conclusions (page 181-182). *Motivation* is spelled out by Pais et al to be the enhanced heat transfer, hence better cooling (see “Conclusions”, page 182). Parenthetically, the physics behind the superior heat transfer of submerged jets over free surface jet impingement has long been understood: see, e.g., Christiaens et al (5,795,063), especially the discussion in col. 8, l. 35-63).

Eggers does not necessarily teach the claimed means for serially circulating. However, it would have been obvious to include said means in view of the cooling apparatus as taught by Alger et al comprising a liquid coolant reservoir 23 (col. 2, l. 23-24) while the liquid coolant is pumped from the reservoir (through 27, see col. 2, l. 24 and Figures 1 and 2) through the nozzle 29 (col. 2, l. 57-60) to the (in application to Eggers low Z) target material to cool the target material (see rejection of claim 1 above) and through a heat exchanger 28 (col. 2, l. 24-27) to remove heat from the liquid coolant (a cooling system necessarily effects the exchange of heat and hence is a heat exchanger), as well as means for serially circulating said liquid coolant between said reservoir 23, said heat exchanger 28 and said accelerator based neutron source 11 in the form of pump 27 and nozzle 29 (col. 2, l. 24 and col. 2, l. 28-30). *Motivation* to include the teaching by Alger et al in the invention by Egger and Lidsky et al derives from the more efficient cooling through improved circulation as expressed by Alger et al (col. 1, l. 19-33 and 45-65) as is also generally known in the art of cooling apparatus as

conventional, while circulating enables re-use, which is important for a more expensive coolant such as gallium, which expense is, however amply compensated by the much higher coefficient of thermal conductivity (see applicant's admission in this regard on page 7 of the Specification). In the combined invention, the liquid gallium from the reservoir through the nozzle impinges on the surface of the low Z target material within the neutron source assembly and is transferred directly to the heat exchanger, and from said heat exchanger to said reservoir by virtue of the close loop taught by Alger et al (see abstract).

END OF GROUND OF REJECTION.

(10) Response to Argument

Ad (A): Applicant's Argument in Appeal of the rejection of claims 1,4, 5, 7 and 8 under 35 U.S.C. 112, first paragraph, is that because the chamber is "filled" with liquid gallium and a cross-sectional view shows a nozzle in said chamber, the Specification teaches that the nozzle must be submerged in said liquid gallium, on account of which the limitation "nozzle submerged in liquid gallium" (claims 1, 5 and 8) is supported by the original Specification. See pages 5-11. Examiner disagrees for the following reasons:

Said argument is not persuasive because a cross-sectional illustration only can show overlap, not the three-dimensional containment required by being submerged. It is additionally deficient because to "fill" does not necessarily imply "completely fill". Hence, even arguendo, an object in a chamber filled with a fluid is not necessarily submerged in said fluid. Appellant's argument in traverse of said rejection based on his teaching that the liquid gallium fills the chamber 40 and does not teach partial fill are not

persuasive because the absence of a teaching of partial (incomplete) fill does not imply the teaching of a complete fill. Appellant's argument (page 6, second paragraph) that "since the outlet 30, as illustrated in original Figure 2, from the stainless steel housing 31 is located above the top surface of the beryllium target 32, the reservoir will fill with liquid gallium" connects a structural property with a capability of filling without the disclosure in 3D of the reservoir. Said capability thus does not follow, while even arguendo, such alleged capability does not itself constitute support in the present method claims. Examiner also maintains that the jet-liquid surface configuration by Pals et al shows that a jet from a nozzle <u>can</u> be submerged without the nozzle being submerged, with reference to Figure 1. Appellant's argument that examiner's statement that "the absence of a teaching of partial (incomplete) fill does not imply a complete fill" has no relevance to Appellant's position is a departure from his position as stated in Remarks on page 5, fifth full paragraph, and as such is a new argument. Appellant apparently insists that the only meaning of the verb "fill" is "completely fill". Examiner disagrees: see Response to Argument, part C (page 13 of the Final Office Action, especially comments on the use of distinctions between completely filled and partially filled. The fragment in Pals et al cited by Appellant (first sentence of third paragraph of page 182) pertains to a case distinction, not an overall statement on the inherency of submerged nozzle for submerged jets, which is the only way Pais is cited for in the rejection under 35 USC 112, first paragraph. In summary, a statement that a chamber is filled with a liquid and a single cross-sectional view capable inherently of showing only a cross-section of said nozzle is insufficient disclosure for support of the limitation that the

nozzle be submerged in said liquid, because of two reasons: (a) the chamber may be partially filled rather than completely filled, (b) "submerged" implies surrounded in three dimensions, which does not find support in the Specification. For these reasons the rejection under 35 USC 112, first paragraph, should be maintained. Parenthetically, the annotation of Figure 2 shown now by Appellant differs structurally from the original and hence cannot be accepted, because at the very least it misrepresents Figure 2 and introduces thereby also a new argument.

<u>Ad (B):</u> Appellant's first argument in Appeal of the rejection of claim 1 under 35 USC 103(a) is based on the material constitution of the wall (pages 11-13, 16-19 and 23-25). The argument is that with a change in coolant a change in wall constitution is required, and that without such change the liquid coolant would dissolve the wall material in a matter of minutes.

Said first Argument is not persuasive because as it now turns out (new argument) the appeal is based on operating temperatures being very high while actually now disclosure indicates any such high temperatures at all, while arguendo Aluminum as used by Eggers (the first reference) is known as a suitable material for a liquid gallium container as shown by Morel et al, cited for establishing fact, not teaching.

Said first argument is also not persuasive for all of the reasons provided in "Argument D" on page 14 of the Final Office Action, - including reasons that have nothing to do with a copper or aluminum material embodiment but simply with the obviousness to adjust the material embodiment of a wall with a change in the material

constitution of the coolant, and on which Appellant does not even comment, on account of which Appellant's comments in traverse and Appellant's after-final response and Argument #1 may be considered non-responsive. All of said reasons are herewith included by reference in their entirety. It is further noted that the argument on temperature now submitted as specific traverse for copper containment of liquid gallium is contradicted by Appellant's previous statement that "liquid gallium dissolves aluminum or copper in a matter of minutes or a few hours depending on temperature", once again repeated in After-Final Remarks, in which statement the temperature dependence has been taken into account. Also, the specification does not provide a range of temperature during operation. Furthermore, said argument on temperature, at least in light of the above previous statement, is both new and incorrect, as witnessed, for instance by the use of liquid gallium - copper connections in a neutron source, specifically a pulsed thermonuclear device, as witnessed by Filatov (RU 2069391)(see abstract). Appellant is reminded that a thermonuclear device inherently is a neutron source except for the truly exceptional and non-conventional case of aneutronic fusion, while the liquid gallium in Filatov carries considerable current. Finally, counter to Appellant's traverse that Alger only teaches that liquid coolant may pass through the heat exchanger, Alger teaches that it actually does so (Figure 1), whereupon returning to the reservoir the claimed serial circulation is completed. Therefore, said traverse fails to persuade.

(C) With regard to Appellant's second argument in appeal of the rejections under 35 USC 103(a) (page 13-15, 19-24 and 25-28) that Alger only teaches that liquid coolant

may pass through the heat exchanger, Alger teaches that it actually does so (Figure 1), whereupon returning to the reservoir the claimed serial circulation is completed. The serial flow is: reservoir-nozzle- target-reservoir-heat exchanger-reservoir. Although a component is interposed the adverb "directly" cannot exclusively mean “without any component interposed”, given the Specification as disclosed, wherein the adverb "directly" has not been directly defined within the context of the pertinent limitation "directly to a heat exchanger", while the Drawings only make it clear that "directly" cannot mean "without any component interposed; see Figure 1 and components 26 and 28. Therefore, "directly" is interpretable as "in the manner of direct variation" (cf. Merriam-Webster's Collegiate Dictionary, tenth Edition, p. 328), which is met because the liquid gallium in Alger can be said to flow from the neutron source to the heat exchanger and from the heat exchanger to the reservoir. Hence also appellant’s second argument fails to persuade. In response to Appellant's comment on page 12, first three lines, both Filatov above and Morel et al are cited, respectively here in response to Appellant's demand, and in the final office action, to establish fact, not teaching; hence Morel et al is correctly not included in the ground for rejection under 35 USC 103(a).

In conclusion, the examiner respectfully submits that for the above reasons Appellant's arguments fail to persuade and the rejections under 35 USC 112, first and second paragraph, and 35 U.S.C. 103(a) are correct.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner’s answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Johannes P Mondt/
Primary Examiner, Art Unit 3663

Conferees:

Jack Keith, /J. W. K./

Supervisory Patent Examiner, Art Unit 3663

Meredith Petravick /mcp/